Sri Lanka Institute of Information Technology

B.Eng. (Hons) / B.Sc. Eng. (Hons) in Electrical & Electronic Engineering

End Semester Examination
Year 2, Semester I

Object Oriented Programming (EC2492)

Duration: 2 Hours + 10 Minutes Reading Time

May 2017

Instructions to Candidates:

- This is an **open book** examination.
- Reading time of 10 minutes given in addition to the exam duration.
- This paper contains 5 questions. Answer **three questions** only.
- Each question carries equal marks.
- Answers should demonstrate OOP concepts, Java Technologies such as multithreading, Sockets, Collection framework, System API and programing techniques such as Singleton classes, efficient flow control etc. Properly organized and clean codes are expected. Please print in clear hand writing.
- Calculators are allowed to be used.
- This paper contains 6 pages including the cover page.
- This paper contributes 50% for the overall mark.

Question 01 [100 Marks]

Create a suitable class structure for the given scenario. Method signatures on getters and setters are accepted.

ABC Tour Management Company offer services to both local and foreign tourists to organize vacation packages in Sri Lanka. Each tour is coordinated by a designated tour officer at ABC and the tour manager overlook the process. Local tourists directly get through to the Colombo office and foreign tourists are connected through different agents appointed to other countries by ABC.

A tour would comprise of hotel stays, visiting scenic and historical places, shopping and a beach stay (staying in a beach hotel). Depending on the duration, tours might skip some of the above segments. Once a tour is finalized the transport manager and reservation manager are automatically informed by the system and both managers assign respectively transport officers and reservation officers to handle the arrangement.

The reservation department manages hotels and restaurants repository. Reservation officer creates reservation vouchers of every tour for each hotel/restaurant and inform them in advance.

Transport department handles coordination of 3rd party vehicle fleets, drivers and other suppliers such as balloon rides, jeep rides, elephant rides.... etc. After an officer is allocated to a tour he/she creates transport/service vouchers and informs respective parties in advance. Tour guides are also allocated by the transport department. A sample tour summary report is given.

Tour Code:15/11/0009
Tour Start Date:2015-12-01
Tour End Date:2016-02-29
Number of Pax:15
Tour Language: French
Tour Market: France

Summary Report

Currency Convertion: 1 To 130

Client Details

Client name	Passport	Address	Mobile	Email
ADD HOC	MG_DN2015110010	11 street, paris, north, centre, France	775698321	addhoc@gmail.com

Arrival Details

Arrival Date	Arrival Time	Pax	Flight	Hotel	Driver	Guide	Vehicle Owner	Remarks	Price($)
2015-11-13	17:18	15	UL 505	Galadari Hotel	-	Tharindu			65

Departure Details

Departure Date	Departure Time	Pax	Flight	Hotel	Driver	Guide	Vehicle Owner	Remarks	Price($)
2015-11-13	17:18	15	FR 305	CINNAMON LAKESIDE COLOMBO	-				50

Activity Details

Site Name	Activity	Visiting Date	Time of The Day	Pax	Total	Reference No	Remarks	Price($)
Galle Fort	Galle Fort	2015-12-01	Morning	5	0		test remarks	15
National Museum	National Museum	2015-12-03	Before Lunch	5	0			20
Colombo by Jeep	Colombo by Jeep	2015-12-06	Night	5	0		Please provide safety instruction first	30

Accommodation Details

CheckIn	CheckOut	Hotel	Room Cat	Meal	Room type									Remarks	Price($)
					SGL	DBL	DBLEx	TPL	TWN	LRG	Child W Bed	Child W/O B	Guide		
2015-12-06	2015-12-12	Corel Reef Beach Hotel	Luxury	Half Board	5	0	0	0	0	0	0	0	0	Test remarks	110
2015-12-14	2015-12-16	Galadari Hotel	Delux	Room Only	5	0	0	0	0	0	0	0	0	remarks test 4	120

Please clearly mention your assumptions.

Question 02

[100 Marks]

Develop the following code in Java.

Create a server using sockets allowing the following features to the client.

i. Should record the client's incoming IP and request timestamp. Should reply with Hello <IP> for the initial call.

ii. Once the client asks for available services should give the options as
[1] Get server time [2] list files [3] Client List

iii. On option 1 should return the server's current time. On option 2 return the list of files in the folder /temp (Assume server has rights to read/write this folder). On option 3 return the number of clients currently connected.

iv. Server should be multithreaded to handle multiple clients at a given time.

v. Once a client say "BYE" should close the connection.

Client should perform as follows.

i. Call server with the given IP address and port. Say "Hello".

ii. Once received the servers Hello acknowledgement should reply "What do you offer".

iii. Select a given option randomly and say "Service <Op number>.

iv. After performing this several times says "BYE" the connection should be closed.

Proper resources management and exception handling is expected in your code.
Dialoguc between a server and client would be as follows.

```
Client > Hello
Server > Hi 192.168.0.15
Client > What do you offer
Server > [1] Get server time [2] list files [3] Client List
Client > 1
Server > Wed May 03 21:45:18 IST 2017
Client > 3
Server > 4 clients
:
:
Client > BYE
```

Question 03 [100 Marks]

Develop the code for the given class(s).

A taxi system collects locations of each taxi registered on their initial login time and once a tour end. When a customer mobile app connects to the system requesting for a taxi it comes along with customer's current location. System should send the customer's app the nearest 5 taxis at the given time. Customer selects one and returns the response and system should inform the taxi app that it is selected by the respective customer with the registered name and phone number. At the same time, customer app will receive driver's phone number as well.

Create a TourManager Class with the above features considering following points. Multiple customers and multiple taxis will be sending requests at the same time. Collection of taxi data need to be updated rapidly and searching through this collection should happen relatively fast.

Info:
Location is to be recorded as latitude and longitude upto 4 decimal places accuracy.
Distance between two points in a Cartesian plane is calculated as follows.
A (x_a,y_a), B(x_b, y_b) => distance between point A and B is $\sqrt{\{(x_b-x_a)^2 + (y_b-y_a)^2\}}$
Once a taxi is selected for a tour it should be available until it finishes the given tour.

Hint:
Create a client session each time a client looks for taxis and it can hold client data until the tour finishes.
Retrieving data from DBMS, TX between mobile devices are not to be bothered in this program.
You are free to create any entity or supporting class as per your design. Please state your assumptions clearly.

Question 04 [100 Marks]

Develop the following code in Java.

A simple card game that works with the count. Game is in single player mode where the other player is simulated by computer. First you need to shuffle the card pack [a standard pack] and let the human player enter his/her name. After that let the player take a card from the deck without looking at the value.

Card should be from a valid family and within A - 10, if the card is King, Queen or Jack player get to choose another card. Game value A as 1 and whoever gets 21 marks at first wins the round. If a player passes 21 without hitting the exact total opponent wins.

Chosen cards cannot be put back to the deck before the current round ends.
Human player should be able to decide to play another round or not.

Info: Card families [Spades, Hearts, Diamonds, Clubs], Game doesn't count the two jokers in the original deck.

Game output should show, who is playing now. Current card chosen and scores of both players after each card.
Winning and losing status.

Question 05 [100 Marks]

Create a code to simulate a vending machine with the following conditions.

A vending machine would sell packed food and beverages. All merchandises are priced from 1 - 20. Any buyer comes in first loads coins and bills to the machine and select items. Coins goes from 0.5, 1. 2. 5 and bills 10 and 20. While selecting items the machine should show the current balance and once done with purchasing balance should be given back to the customer.

If the machine is out of cash, or going low on merchandise it should inform the maintenance company.

******End of Question Paper******